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SHELTERWOOD

Harvest Methods and Results for Coniferous Species 1930 to 1964

A BIBLIOGRAPHY

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PREFACE

This bibliography was compiled at the request of a research scientist of the Pacific Northwest Forest and Range Experiment Station, U.S. Forest Service. Shelterwood harvest methods are here considered as the removal of mature timber in a series of cuttings over a period of years, by means of which the establishment of natural reproduction under the partial shelter of seed trees is encouraged. Articles are listed alphabetically by author. When the title does not identify the species or harvest method studied, an annotation supplies that information. Items also include foreign publications and are listed for the years 1930 to date.

Sources consulted were: Agricultural Index, 1930-45; Centralized Title Service card file; Forestry Abstracts, v. 1, 1939, to 26(2), 1965; Portland Forest Service Library catalog; and Portland Forest Service Library pamphlet collection.

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Anonymous.
1956. Clear-strip, shelterwood-strip and group-selection felling trials in mixed pine-fir-beech forests. Orm. Arast. Enst. Yil Bult. 4: 7-18, 45-46, 58-64. [In Turkish]

Alexander, Robert R.
1963. Harvest cutting old-growth mountain spruce-fir in Colorado. Jour. Forestry 61: 115-119.

Records of reproduction following alternate clear-strip circular patch clearcutting and individual tree selection.

Atrohin, V. G.
1963. The technical process of shelterwood fellings with preservation of advance growth. Lesn. Hoz. 16(8): 17-21. [In Russian]

The author describes trials for improving the percentage of spruce in birch/spruce stands by mechanized shelterwood fellings (powersaw and tractor skidding) with preservation of spruce advance growth.

Bedell, G. H. D.
1948. White spruce reproduction in Manitoba. Canada, Dominion Forest Serv., Silvicultural Res. Note 87, 16 pp.

This is a comparison of shelterwood and seed-tree cutting systems.

Benzie, J. W.
1963. Cutting methods in mixed conifer swamps, Upper Michigan. Lake States Forest Expt. Sta., U.S. Forest Serv. Res. Paper LS-4, 24 pp.

Shelterwood felling is one of the systems studied.

Bosbouwproefsta., T. N. O., Wageningen, Netherlands.
1957. N content of the needles of Douglas fir. Korte Meded. 30: 8-9. [In Dutch]

The conclusion is that strip systems of felling are preferable to shelterwood or clear felling.

Boyd, Raymond J.
1952. Effect of harvesting methods on reproduction in the mountain Engelmann spruce-alpine fir type. U.S. Forest Serv. Rocky Mountain Forest & Range Expt. Sta. Res. Note 11, 2 pp.

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Burnham, C. F., Ferree, M. J., and Cunningham, F. E.
1947. The white pine/oak forests of the Anthracite region. U.S. Forest Serv. Northeast. Forest Expt. Sta., Sta. Paper 8, 35 pp.

Methods of cutting which would help to restore the forests are suggested. A shelterwood system is recommended.

Croker, T. C.
1956. Can the shelterwood method successfully regenerate longleaf pine? Jour. Forestry 54: 258-260.

Crossley, D. I.
1956. Fruiting habits of lodgepole pine. Canad. Forest Res. Br. Tech. Note 35, 32 pp.

In shelterwood or seed-tree fellings, where trees are to be relied upon to seed annually, those classed as open coned will be the most efficient and should be reserved.

Danilik, V. N., and Komissarova, L. A.
1963. Shelterwood and selection fellings in the Kusa lespromkhoz (S. Urals). Lesn. Hoz. 16(12): 29-32. [In Russian]

In view of the failure of conifers to regenerate on clear fellings, experimental shelterwood and selection fellings were tried.

Davis, V. B.
1955. Don't keep longleaf seed trees too long! U.S. Forest Serv. South. Forest Expt. Sta., South. Forest Note 98, 3 pp.

Seedling mortality was highest close to the overstory pines. Timing of shelterwood felling is considered.

Dziewanowski, R.
1961. Comparative analysis of sawtimber quality of Scots pine from the Mazurian-Podlasie region, with regard to felling age. Sylwan 105(4): 31-54. [In Polish, Russian, English]

Quality analysis led to the conclusion that a shelterwood system should be used, with fellings at 100, 120, and 140 years.

Enander, M.
1947. Shelterwood fellings in Scots pine as a regeneration measure; their execution and economics. Svenska Skogs. Fören. Tidskr. 45(1): 11-22. [In Swedish]

Eyre, F. H., and Zehngraff, P.
1948. Red pine management in Minnesota. U.S. Dept. Agr. Cir. 778, 70 pp.

The results here presented cover (1) seed-tree felling, (2) two-cut shelterwood, and (3) a more intensive system with frequent thinnings and light improvement fellings followed by partial harvest fellings (80-120 years) and then shelterwood fellings.

Flensborg, C. E.
1939. On the regeneration of protection-forest plantations in Jutland. Dansk Skovforen. Tidsskr. 1939: 313-341. [In Danish]

Cutting to gradually open the canopy of spruce, fir (silver), and pine, is considered.

Häggstrom, B.
1960. Shelterwood systems and reserve trees. Skogen 47(5): 99-100. [In Swedish]
The author discusses articles by Kugelberg and presents further comparative data. The trees are pine.

Hagner, S.
1962. Natural regeneration under shelterwood stands. An analysis of the method of regeneration, its potentialities and limitations in forest management in central North Sweden. Medd. SkogsforsknInst., Stockholm 52(4), 263 pp. [In Swedish and English]

Factors studied include changes in vegetation after fellings. The trees are spruce and pine.

Hawley, Ralph C., and Clapp, Robert T.
1942. Growing of white pine on the Yale forest near Keene, New Hampshire. Yale Univ. School Forestry Bul. 48, 44 pp. Shelterwood method of securing reproduction, p. 27.

Hebb, E. A.
1955. Seedfall and cutting systems in Texas shortleaf (pine) stands. Jour. Forestry 53: 846-847.

The systems of felling employed are: (a) single-tree selection, (b) 30-tree shelterwood, (c) clear-felling in strips.

Herman, Francis R.
1962. Shelterwood cutting studied to see if young-growth hemlock can be regenerated by series of successive cuttings. Pulp & Paper 36(12): 61-63.

Holmes, C. H.
1945. The natural regeneration of Ceylon forests. Trop. Agriculturist, Ceylon 101(2-4): 84-90; 136-147; 203-205.

Closely controlled experiments carried out recently show the canopy condition under seedling fellings and the procedure of raising the canopy gradually upwards. The wet, evergreen, high forest is considered.

Holstener-Jørgensen, H.
1958. The effect of shelterwood felling and clear felling on the groundwater of clayey moraine soils. Forstl. Forsøgsv. Danm. 25(3): 291-306. [In Danish]

The trees are spruce and beech.

Il'in, A. I.
1963. Principal fellings in the mountain forests of the N. Caucasus. Lesn. Hoz. 16(2): 24-29. [In Russian]

Shelterwood fellings are best for the *Fagus orientalis* forests and group selection fellings for *Abies nordmanniana*. Detailed recommendations on procedures are made.

Jarvis, J. M., and Cayford, J. H.
1961. Regeneration following various methods of cutting in black spruce stands in Manitoba. Forestry Chron. 37: 339-349.

Because of poor development of *Picea mariana* seedlings under canopy, and the difficulties of seedbed preparation in stands cut by a shelterwood or selection method, it is suggested that some form of clear felling should be used.

Jones, E. W.
1947. Scots pine regeneration in a new forest inclosure (Pinus sylvestris L.). Forestry 21(2): 151-178.

Shelterwood fellings, leaving 20-25 trees per acre, were made during the winter 1940-41. Shelterwood fellings in one compartment were left until the summer of 1941 and the following winter.

Kiscenko, T. I.
1964. Mechanized shelterwood and group-selection fellings in forests of groups I and II. Lesn. Hoz. 17(2): 9-13. [In Russian]

The trees are pine and spruce.

Kugelberg, V.
1959. Shelterwood systems and reserve trees. Skogen 46(22): 456-458. [In Swedish]

Two shelterwood pine stands, mean age 125 and 95 years, respectively, and their treatment and development during the 20 years after the first regeneration felling are considered.

1959. Shelterwood systems and reserve trees. Skogen 46(23): 478-480. [In Swedish]

Economic calculation for a 90-year pine stand treated either by clear felling or as shelterwood with reserves.

Lees, J. C.
1964. A test of harvest cutting methods in Alberta's spruce-aspen forest. Canada Dept. Forestry Pub. 1042, 19 pp.

A two-cut uniform shelterwood system, removing 65 percent of spruce board-foot volume at the first cut and followed by soil scarification, is recommended.

Leibundgut, H.
1946. The irregular shelterwood and group systems and the selection system. Schweiz. Z. Forstw. 97(7): 306-317. [In German]

The selection system will have greater advantage in the silver fir-spruce/beech forest.

Lundgren, A. L.
1959. Costs of marking black spruce for cutting in N. Minnesota. U.S. Forest Serv. Lake States Forest Expt. Sta. Tech. Note 546, 2 pp.

This is a statistical analysis of the time taken to mark wood under the shelterwood system, light selection fellings, and clear-felling system.

Lutz, R. J., and Cline, A. C.
1947. Results of the first thirty years of experimentation in silviculture in the Harvard Forest, 1908-1938. Pt. 1. The conversion of stands of old field origin by various methods of cutting and subsequent cultural treatments. Harvard Forest Bul. 23, 182 pp.

Pine and hardwoods following uniform shelterwood cutting in old field pine, pp. 39-50.

McClay, T. A.
1955. The relation of growth to site and residual density in loblolly pine pulpwood stands. U.S. Forest Serv. Southeast. Forest Expt. Sta. Res. Note 78, 2 pp.

Data were obtained from plots in stands 25-35 years of age, subjected to treatment representing seed-tree or shelterwood felling or moderate or heavy thinning.

Melehov, I. S., and Cilimov, A. I.
1964. Prospects of using multi-purpose machines (i.e. harvesters) in selection and shelterwood fellings. Lesn. Prom. 1964(8): 25-27. [In Russian]

In contrast to other prototype harvesters, this one spares up to 90 percent of the regeneration present on the area being logged.

Metreveli, P. A.
1959. Fellings in the spruce/fir forests of the Georgian SSR. Lesn. Z., Arhangel'sk 2(1): 57-64. [In Russian]

Amounts of regeneration are tabulated for eight forest types, different degrees of canopy closure of the adult stand. Recommendations for selection felling, shelterwood felling, or group-selection felling are given.

Meyer, W. H.
1955. Some treatment effects on loblolly and shortleaf pine reproduction. Jour. Forestry 53: 895-900.

Eighty-acre blocks of second-growth pine were cut each year, 1946-51, under the following treatments: ... (4) retaining a shelterwood of 25 square feet basal area per acre; and (5) retaining a shelterwood of 40 square feet basal area per acre.

Musegjan, A. M.
1959. Principal fellings in the Siberian fir stands of E. Kazakhstan. Lesn. Z., Arhangel'sk 2(6): 43-48. [In Russian]

Both clear-felling and selection systems are unsuitable for the fir stands, and shelterwood management is advised.

Nigeria. West. Reg. Forest Dept.
1954. Report (Tropical shelterwood system) 1953. 12 pp.

Proposals for simplification of the system are given. The present number of operations is considered impracticable on the grounds of labor supply and cost. Climber cutting is recognized as an important means of inducing regeneration.

Penev, N.
1956. Experiments with shelterwood fellings in moist to dry pine forests. Nauc. Trud. lesoteh. Inst., Sofia 4: 51-65. [In Bulgarian, Russian]

Rave.
1956. Increased wood production. Forst- u. Holzw. 11(10): 201-204. [In German]

Discusses the advantages and limitations of natural or artificial regeneration under shelter for 40 years, and computes the increases in sizes of age classes as compared with existing yield tables based on clear felling, for rotations of 100 to 300 years, and for beech, oak, fir, spruce, and pine.

Roe, Arthur L.
1955. Cutting practices in Montana larch—Douglas fir. Northwest Sci. 29: 23-34.

Shelterwood cutting (vigor selection) and shelterwood cutting (economic selection) are included.

Rosevear, D. R.
1947. Practical silviculture in the rain forests of Nigeria. 5th British Emp. Forestry Conf. 1947, 6 pp.

The natural system employed is based on Malayan regeneration fellings and locally known as the tropical shelterwood system.

Ruedi, K.
1946. Synthesis of the irregular shelterwood and selection systems? Schweiz. Z. Forstw. 97(5): 194-209. [In German]

Irregular shelterwood fellings having a definite direction are quite distinct from the strip systems.

Schuler.
1963. The establishment and growing of mixed beech/conifer stands on the soils on primary rock in the Odenwald. Forst- u. Holzw. 18(23): 475-477. [In German]

Current methods of increasing natural regeneration from past years, promoting regeneration by shelterwood and strip felling, and growing different percentages of conifer species in mixture with beech.

Smith, D. N.
1951. The influence of seedbed conditions on the regeneration of eastern white pine. Conn. Agr. Expt. Sta. Bul. 545, 61 pp.

Shelterwood fellings, applied either uniformly or in strips, are best adapted to supply the proper sequence of light.

Stott, C. B., Barton, W. W., and Stone, J. H.
1942. Results of forest cutting practices in various Lake States timber types. U.S. Forest Serv., Region 9, 56 pp.

Effects of cutting practices, ranging from clear-cutting to individual tree selection, recorded by types and stands over a period of more than 20 years. Forest types are chiefly coniferae.

Thomson, C. C.
1950. Experimental cutting in an old red spruce stand in southern New Brunswick. Project M. 1. Canada Forest Res. Div. Silvic. Res. Note 98, 22 pp.

Strip, diameter limit, and transition shelterwood cutting are discussed.

Versteegh, F.
1955. General lines for the management of protection forest in Indonesia. Rimba Indonesia 4(9/12): 481-490. [In Dutch]

The irregular shelterwood system is recommended for forests 1,000 m. above sea level; this would make them productive without increasing the risk of erosion or diminishing their hydrological value. The species include pine.

Vlasev, V., and Kolev, N.
1958. The final felling under a shelterwood system with (three) regeneration fellings at short intervals, done with snow cover and small advance growth. Gorsko Stopanstvo 14(9): 6-10. [In Bulgarian]

The trees are spruce/silver fir/pine.

Westveld, Marinus.
1938. Silvicultural treatment of spruce stands in northeastern United States. Jour. Forestry 36: 944-950. Shelterwood cutting, pp. 946-947.

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